# Appendix E

## Water Chemistry Trends Data

This Appendix presents an analysis of time trends in water quality for 14 intensively-studied streams in Shenandoah National Park. The analysis covers the water years from 1988 through 2001 and provides 14 years of quarterly sampled data for all streams (occasional missing values may occur at some sites).

Streams on Siliciclastic Bedrock include DR01 (Deep Run), VT35 (Paine Run), VT36 (Meadow Run), VT53 (Twomile Creek), and WOR1 (White Oak Run). Streams on Granitic Bedrock include NFDR (North Fork Dry Run), VT58 (Brokenback Run), VT59 (Staunton River), and VT62 (Hazel River). Streams on Basaltic Bedrock include VT51 (Jeremys Run), VT60 (Piney River), VT61 (North Fork Thornton River), VT66 (Rose River), and VT75 (White Oak Canyon).

Analyses of the following water quality constituents are presented:

ANC (Acid Neutralizing Capacity; ueq/L),

Hydrogen ion concentration (ueq/L),

Sulfate concentration (ueq/L),

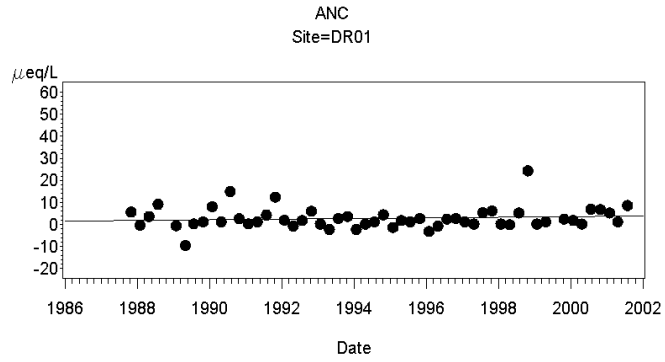
Nitrate concentration (ueq/L),

SBC (Sum of Base Cation concentrations – calcium + magnesium + sodium + potassium; ueq/L),

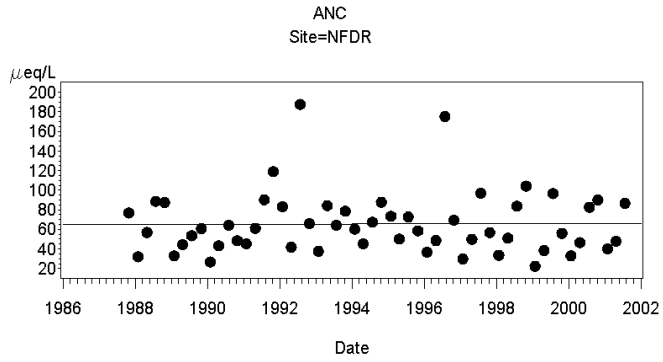
SAA (Sum of Acid Anion concentrations – sulfate + nitrate + chloride; ueq/L), and

Calculated ANC (SBC – SAA; ueq/L).

The concentrations of each analyte for each stream are plotted vs time in this appendix. The coefficients of a linear regression equation fitted to each time series are given in each plot.




Regression Equation:
ALK = -279.8736 + 0.141773*Date




Regression Equation:
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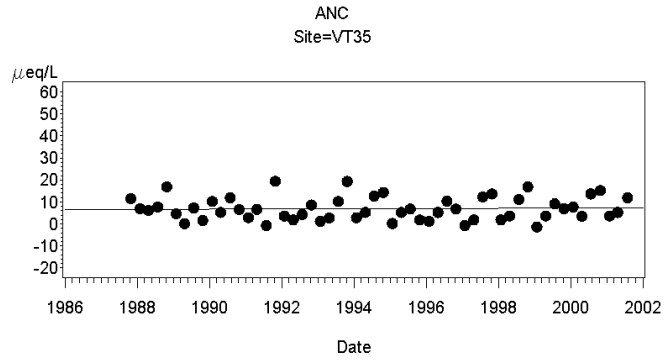
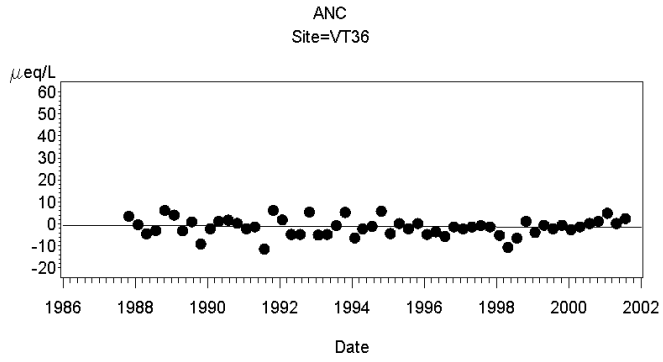
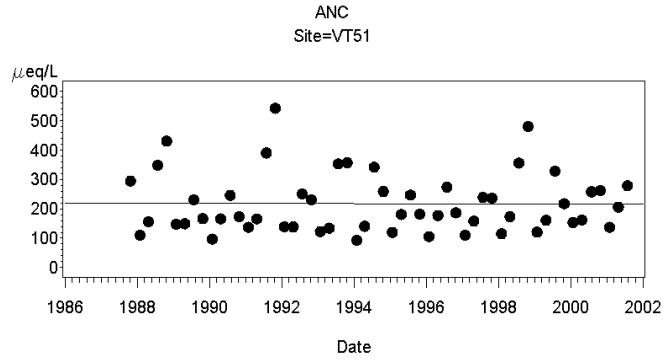


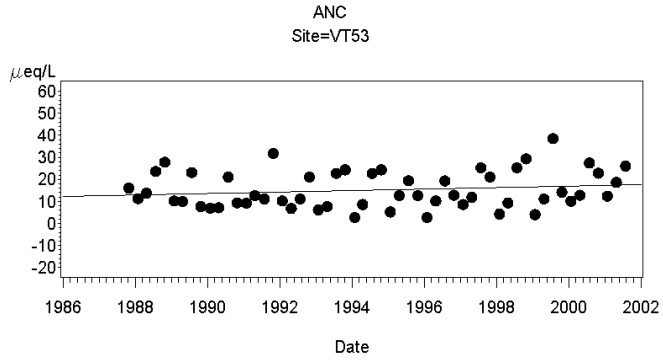

Regression Equation:
ALK = -87.14083 + 0.047204*Date




Regression Equation:
ALK = 95.96497 - 0.048751*Date




Regression Equation:
ALK = 684.2502 - 0.234162*Date




Regression Equation:
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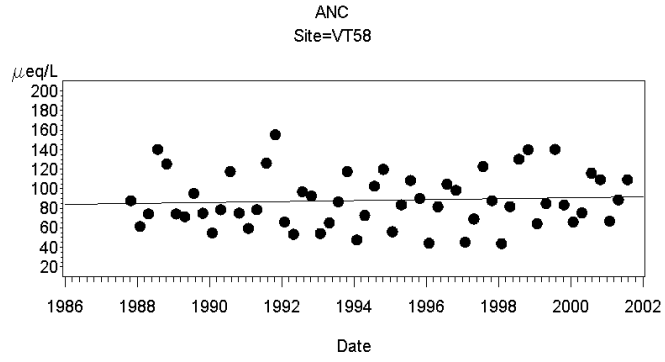
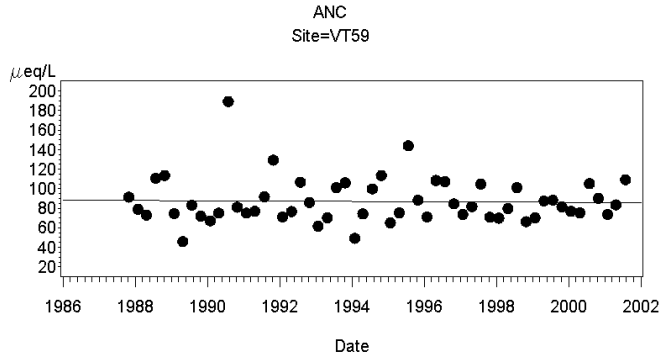
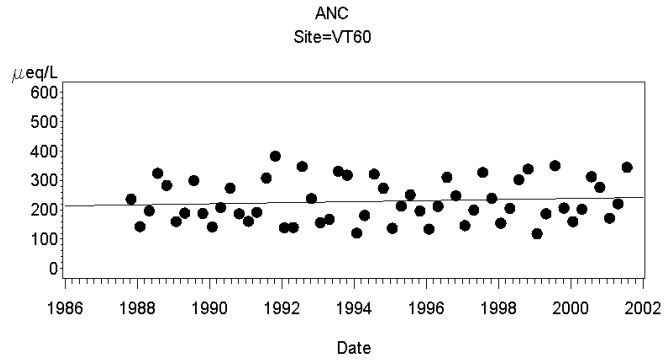



Regression Equation:
ALK = -887.2494 + 0.488895*Date




Regression Equation:
ALK = 413.075 - 0.163335*Date




Regression Equation:
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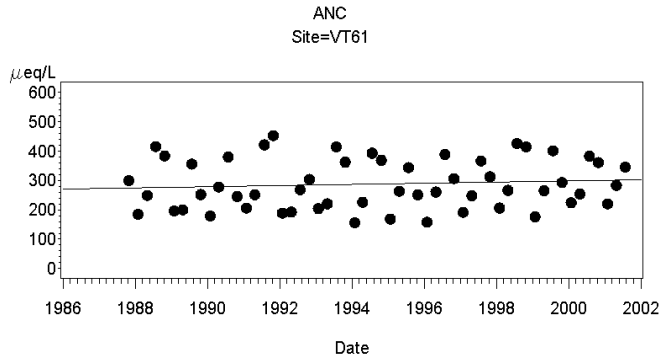


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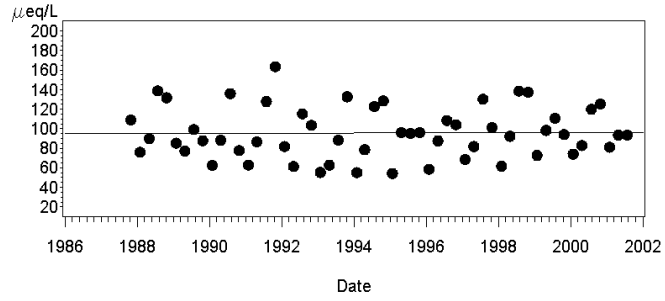


Regression Equation:
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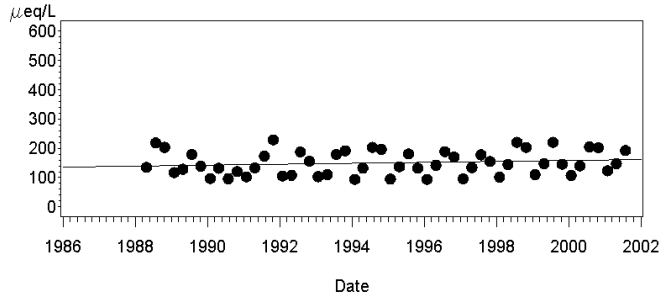


Regression Equation:
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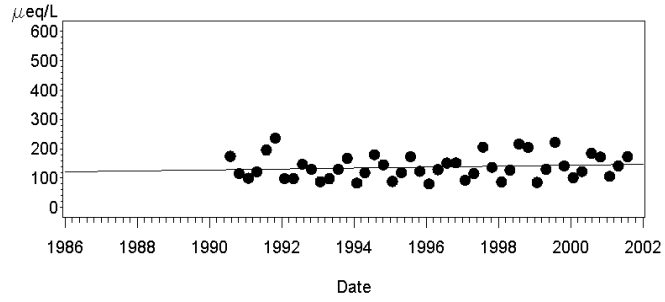


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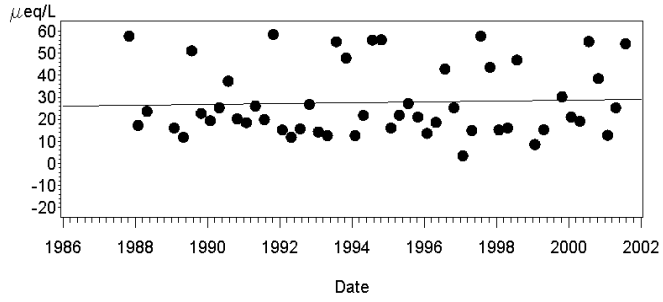


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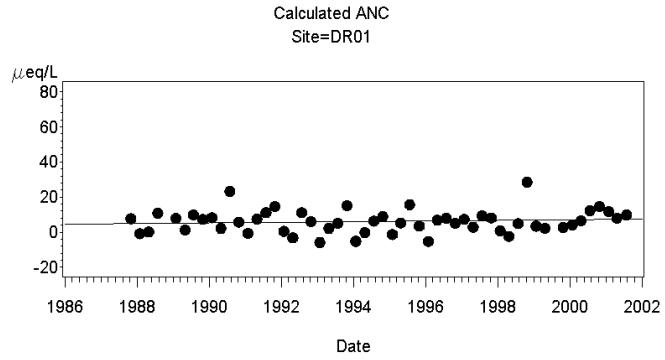


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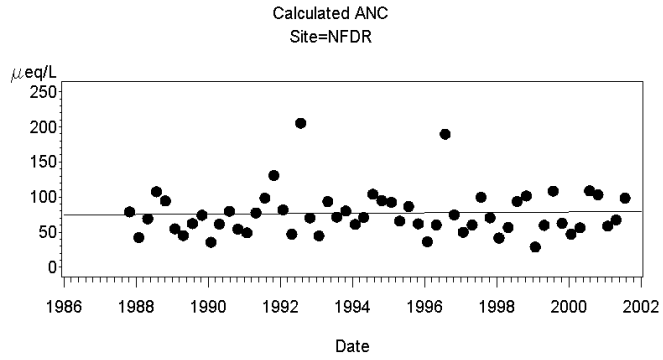


Regression Equation:
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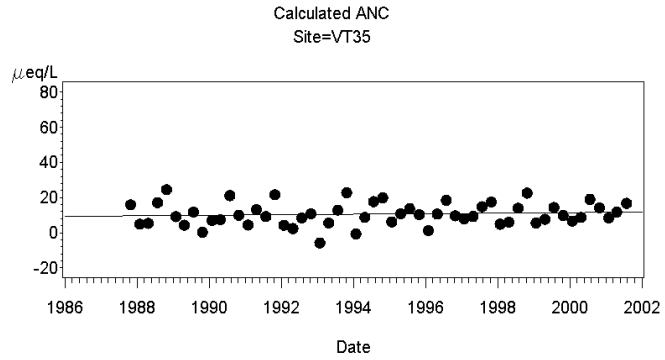


Regression Equation:
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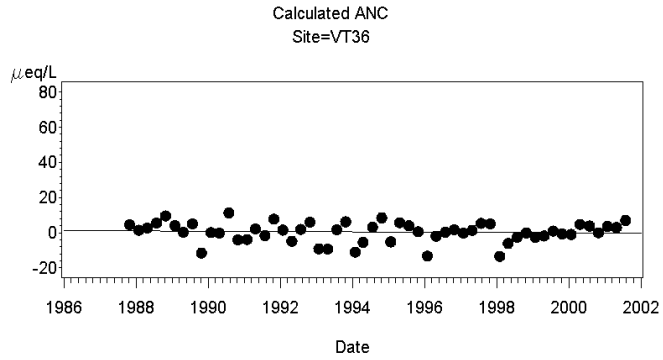


Regression Equation:
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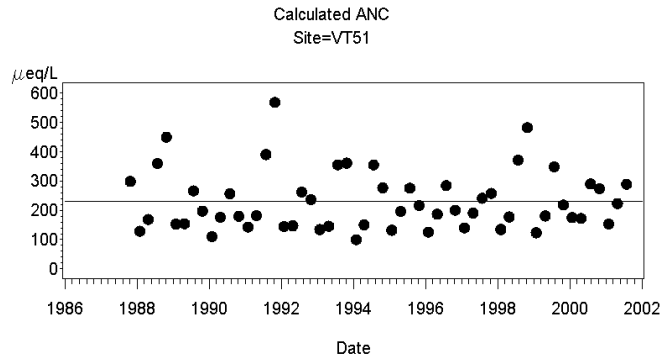


Regression Equation:
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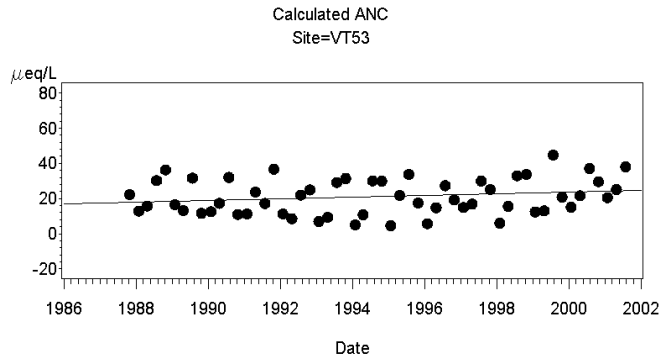


Regression Equation:
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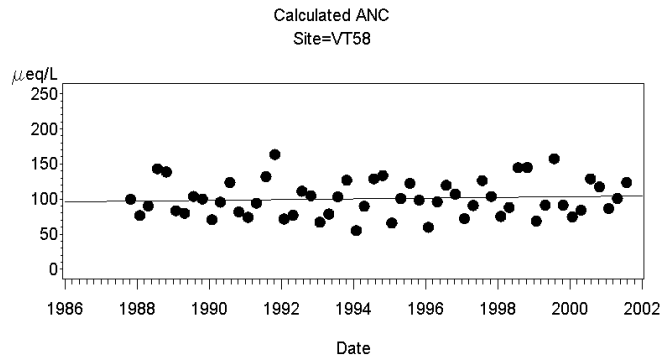


Regression Equation:
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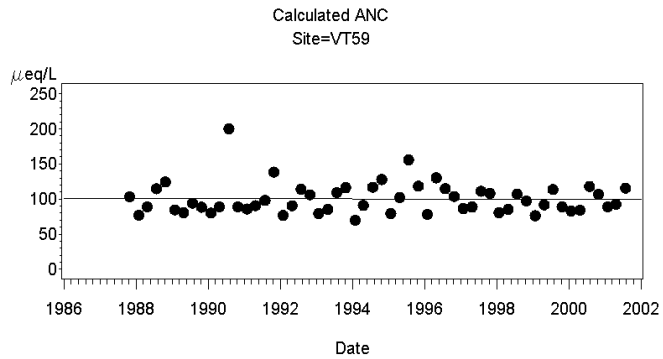


Regression Equation:
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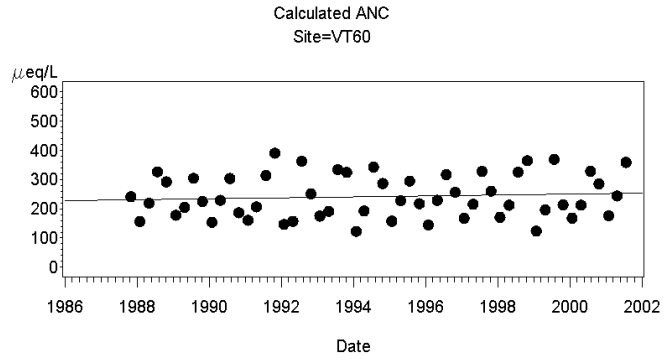


Regression Equation:
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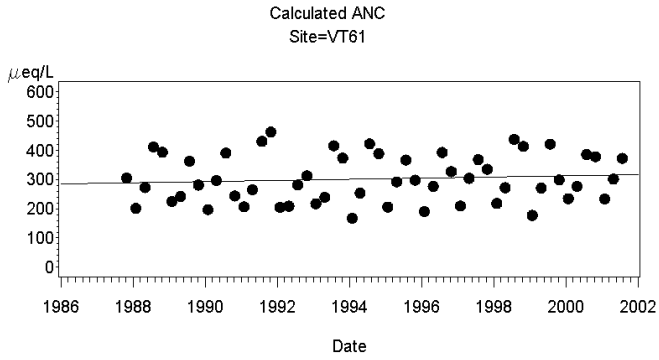


Regression Equation:
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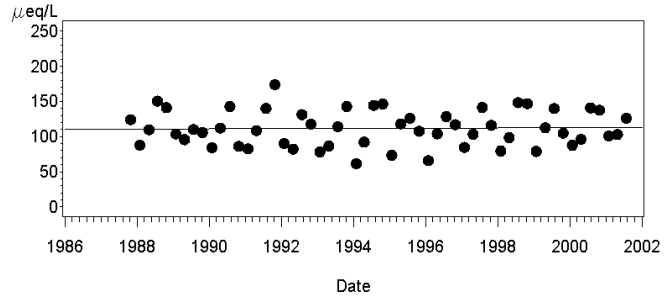


Regression Equation:
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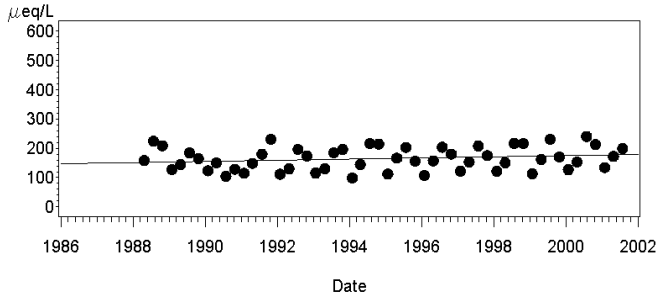


Regression Equation:
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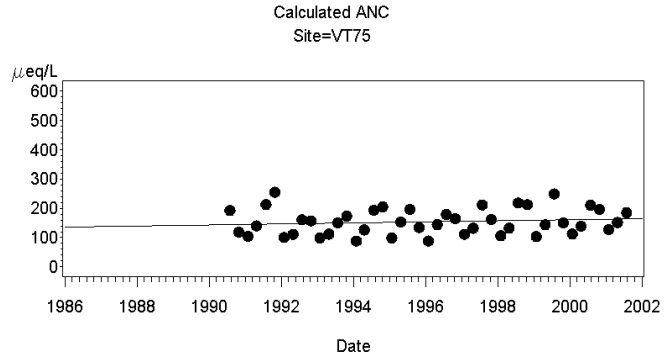


Regression Equation:
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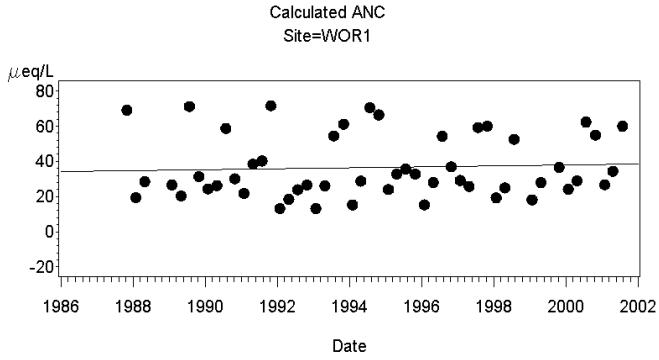
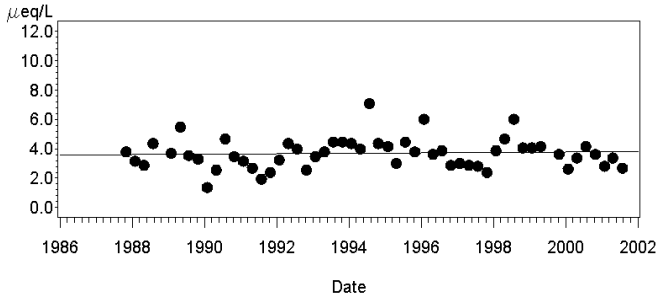


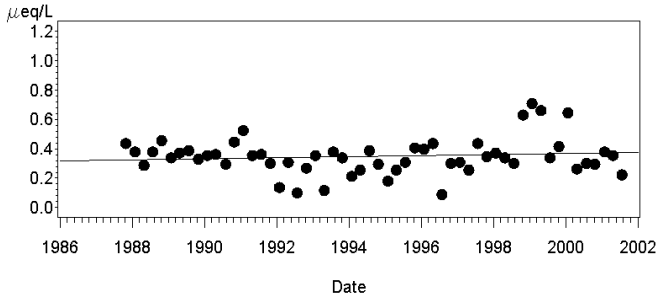

Regression Equation:
calk = -535.3522 + 0.286743*Date

Hydrogen
Site=DR01



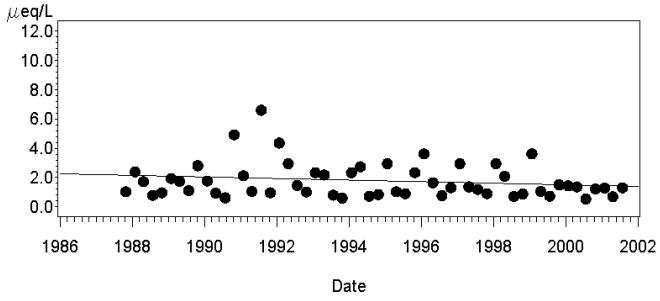

Regression Equation:
H = -27.33784 + 0.015553*Date

Hydrogen
Site=NFDR



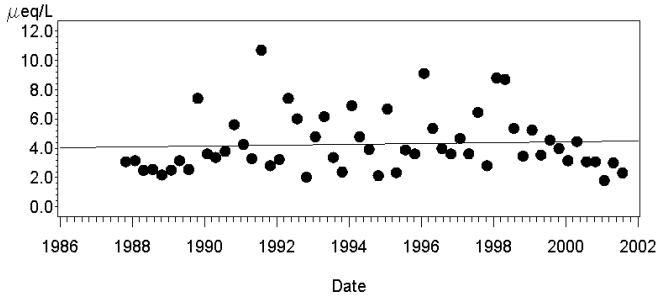

Regression Equation:
H = -6.484087 + 0.003425*Date

Hydrogen
Site=VT35



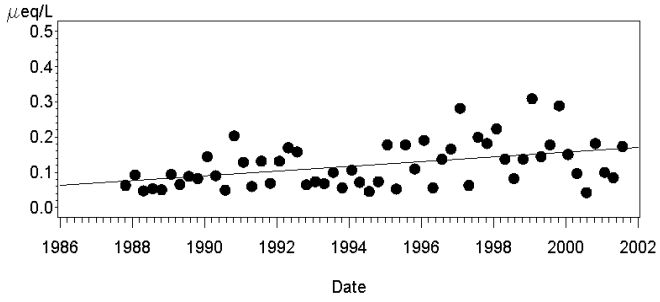

Regression Equation:
H = 109.1118 - 0.053817*Date

Hydrogen
Site=VT36



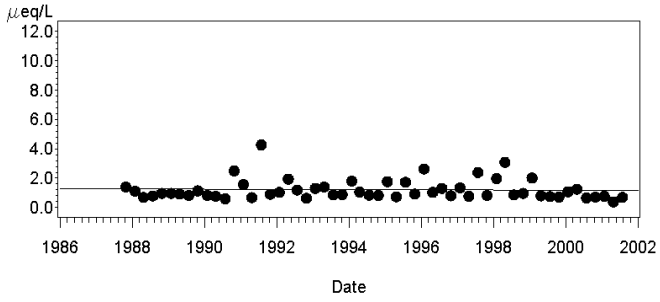

Regression Equation:
H = -51.43175 + 0.027941*Date

Hydrogen
Site=VT51



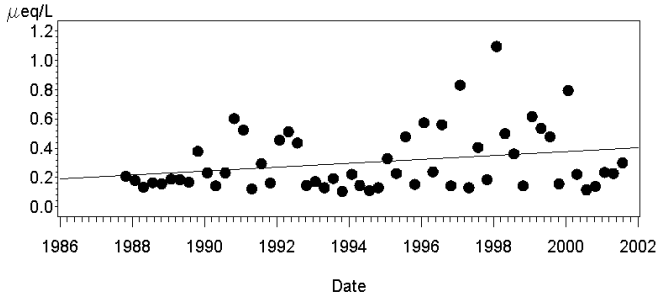

Regression Equation:
H = -13.42908 + 0.006793*Date

Hydrogen
Site=VT53



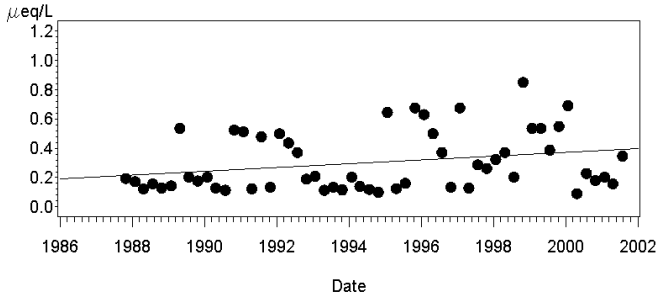

Regression Equation:
H = 17.79643 - 0.008311*Date

Hydrogen
Site=VT58

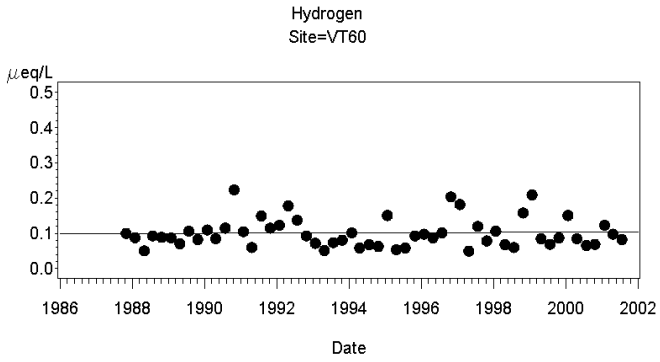



Regression Equation:
H = -25.77014 + 0.013072*Date

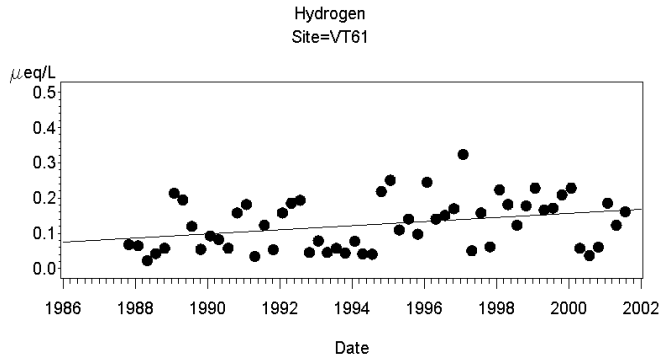
Hydrogen
Site=VT59



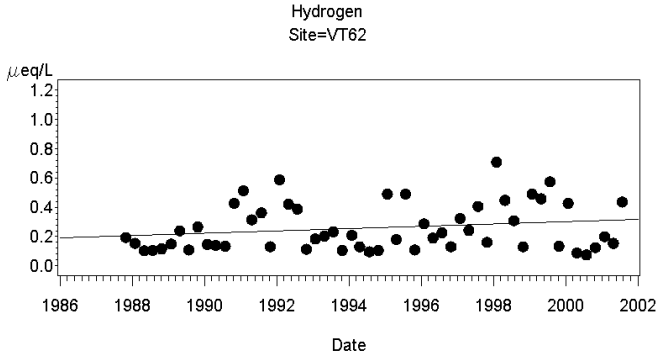

Regression Equation:
H = -25.82814 + 0.0131*Date



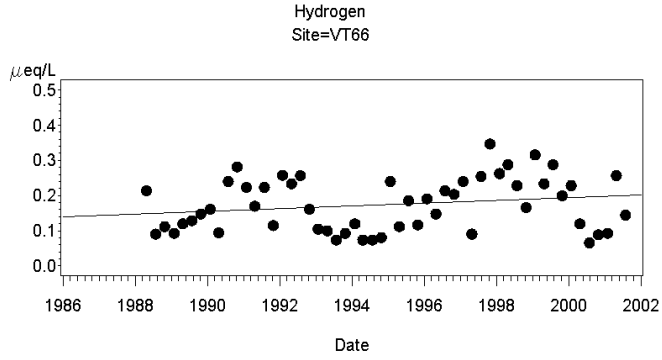

Regression Equation:
H = -0.409651 + 0.000256*Date



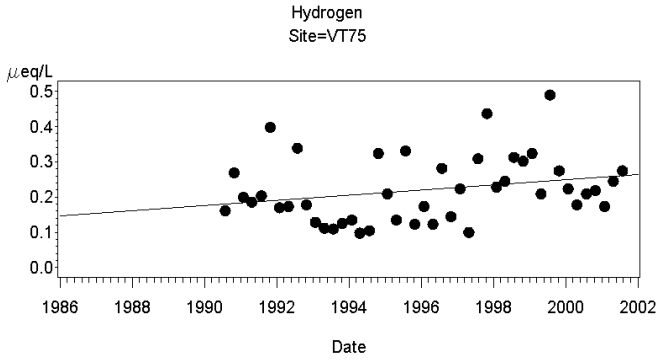

Regression Equation:
H = -11.42078 + 0.005789*Date



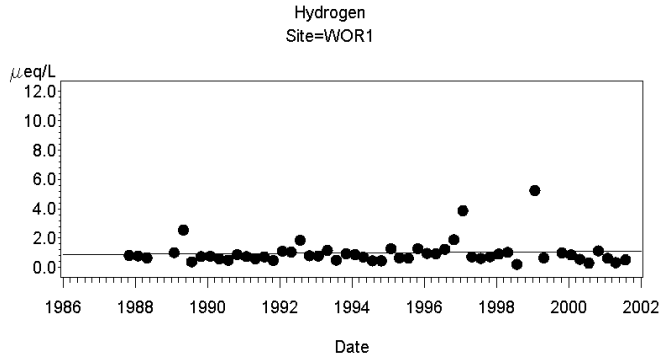

Regression Equation:
H = -15.32971 + 0.007814*Date



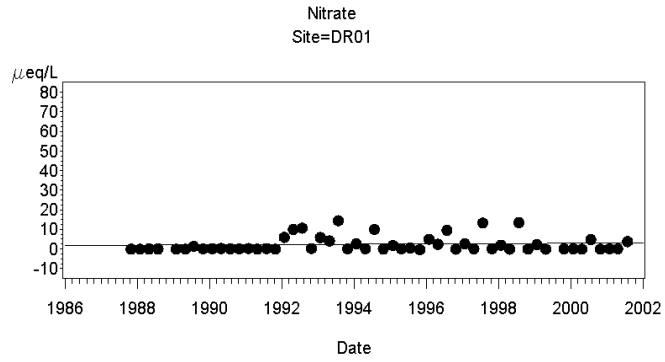

Regression Equation:
H = -7.507262 + 0.00385*Date



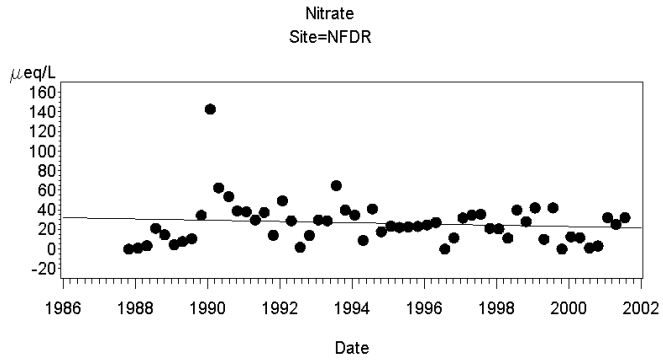

Regression Equation:
H = -14.60083 + 0.007425*Date



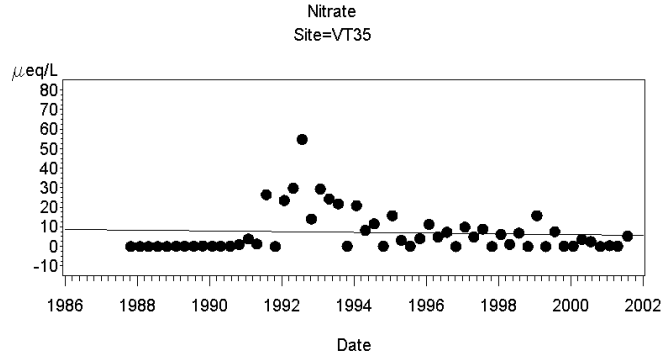

Regression Equation:
H = -32.2156 + 0.01665*Date



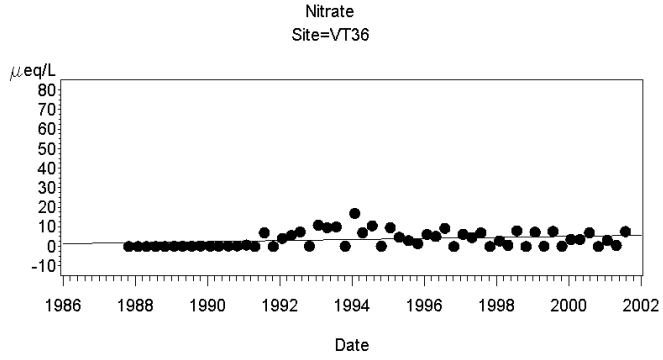

Regression Equation:
NO3 = -198.4712 + 0.100716*Date



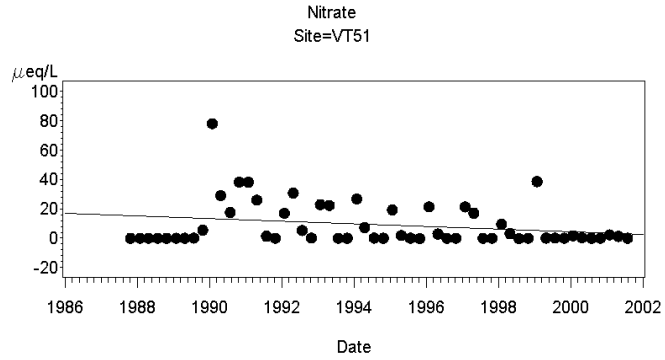

Regression Equation:
NO3 = 1362.745 - 0.670062*Date



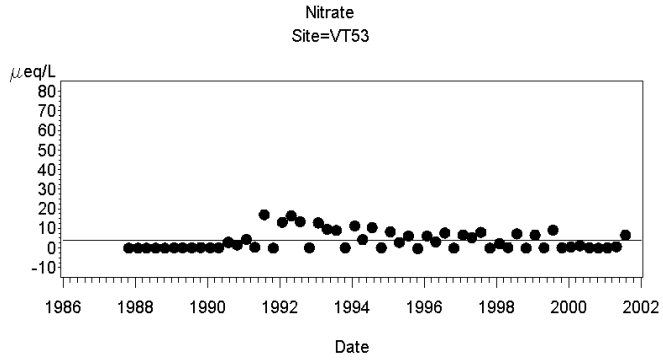

Regression Equation:
NO3 = 369.6376 - 0.181794*Date



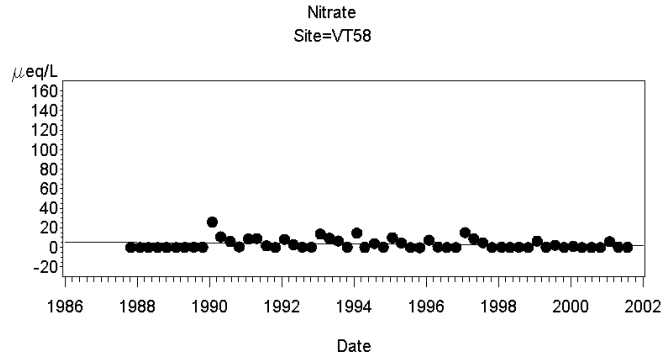

Regression Equation:
NO3 = -504.736 + 0.254847*Date



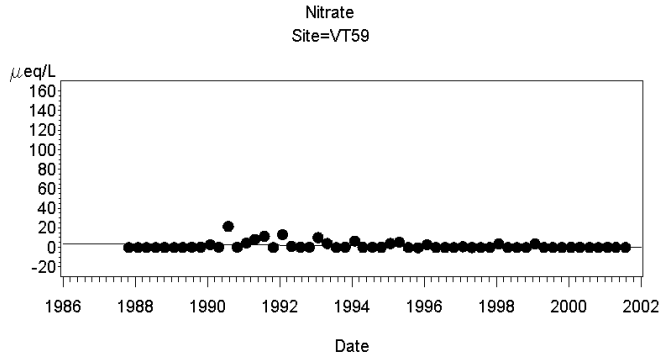

Regression Equation:
NO3 = 1740.047 - 0.86777*Date



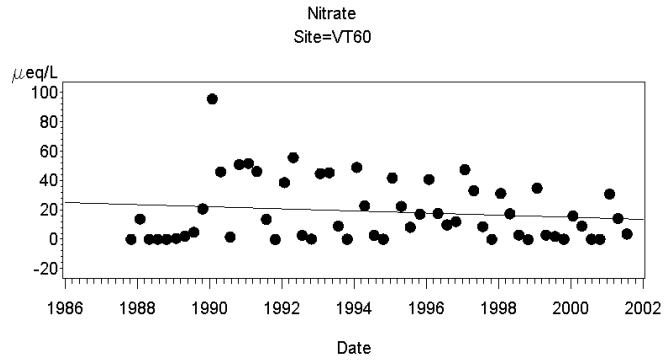

Regression Equation:
NO3 = -29.85814 + 0.016926*Date



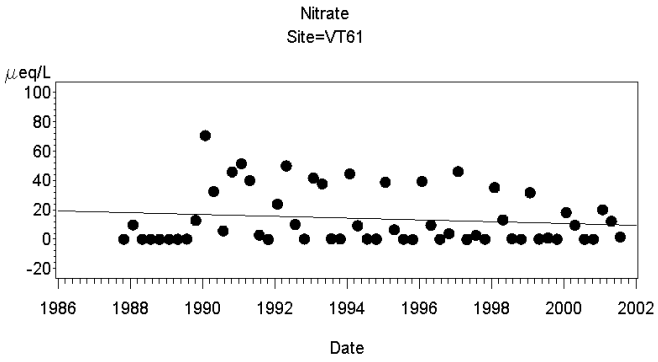

Regression Equation:
NO3 = 362.2943 - 0.179892*Date



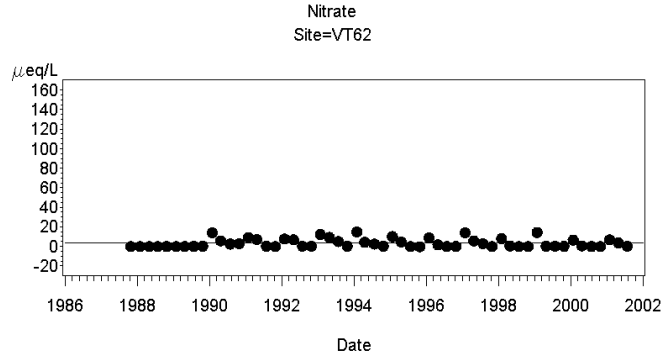

Regression Equation:
NO3 = 461.6683 - 0.230485*Date



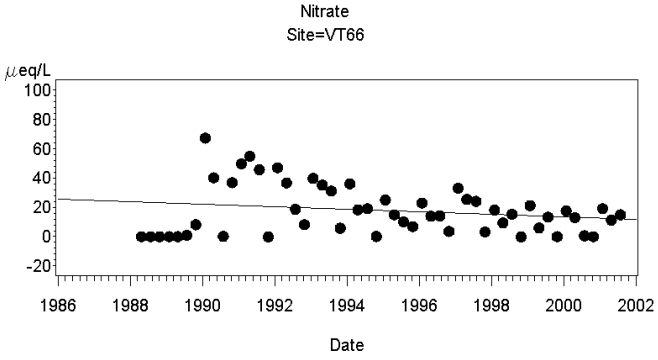

Regression Equation:
NO3 = 1482.256 - 0.733764*Date



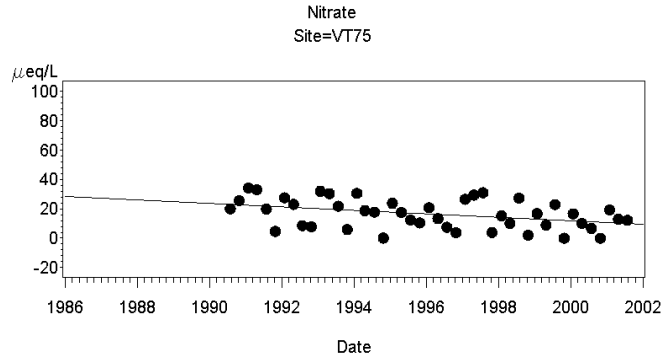

Regression Equation:
NO3 = 1286.58 - 0.638013*Date



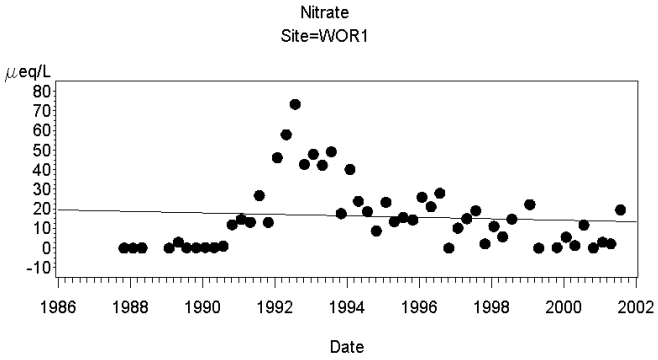

Regression Equation:
NO3 = -47.34606 + 0.025482*Date



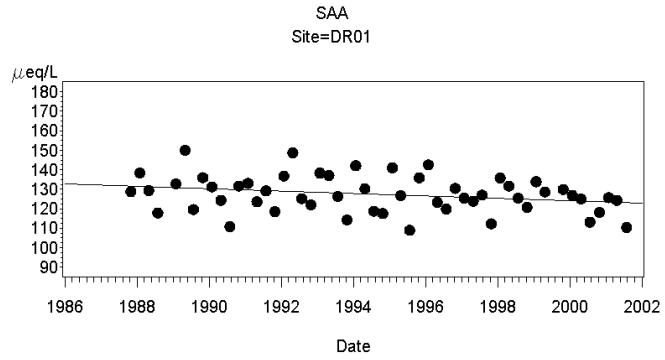

Regression Equation:
NO3 = 1747.833 - 0.867226*Date



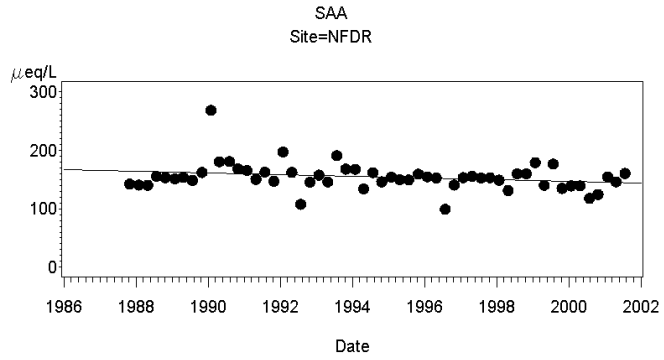

Regression Equation:
NO3 = 2385.95 - 1.187013*Date



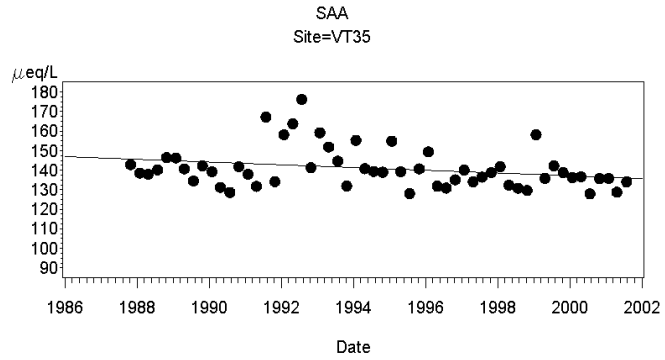

Regression Equation:
NO3 = 743.4187 - 0.364593*Date



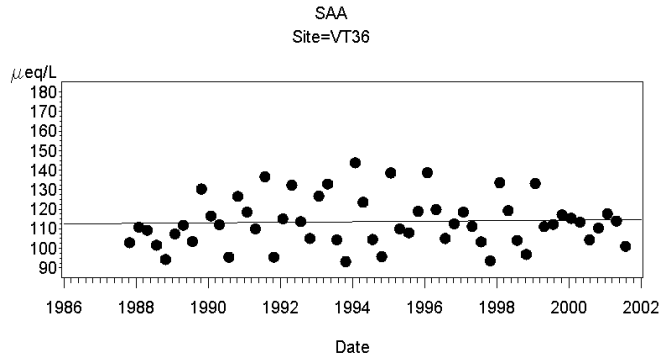

Regression Equation:
saa = 1350.433 - 0.613106*Date



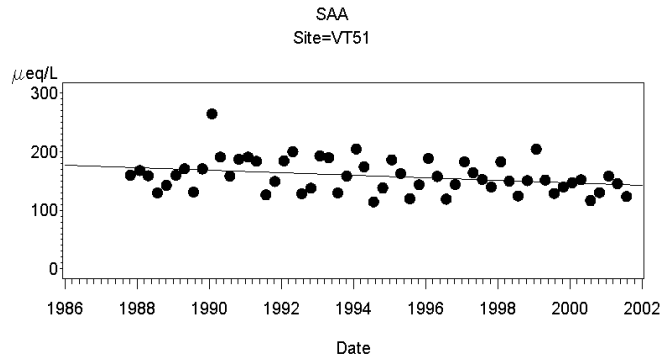

Regression Equation:
saa = 3119.964 - 1.486661*Date



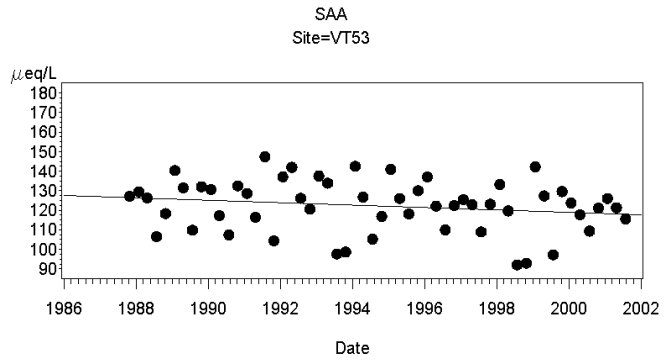

Regression Equation:
saa = 1494.26 - 0.678476*Date



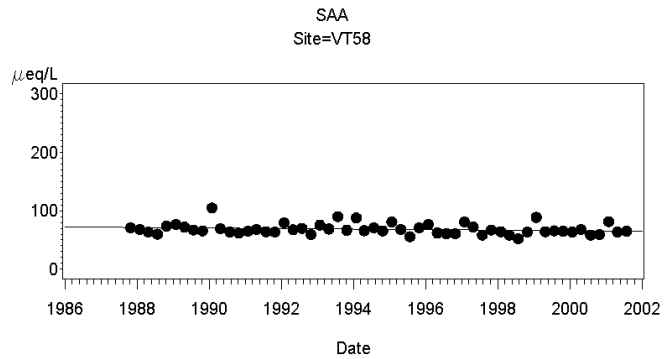

Regression Equation:
saa = -171.8407 + 0.143097*Date



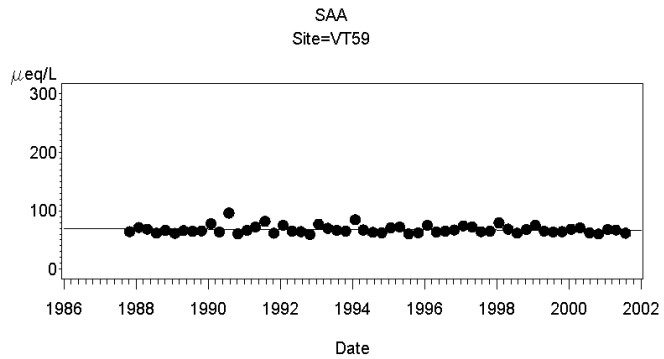

Regression Equation:
saa = 4333.26 - 2.09296*Date



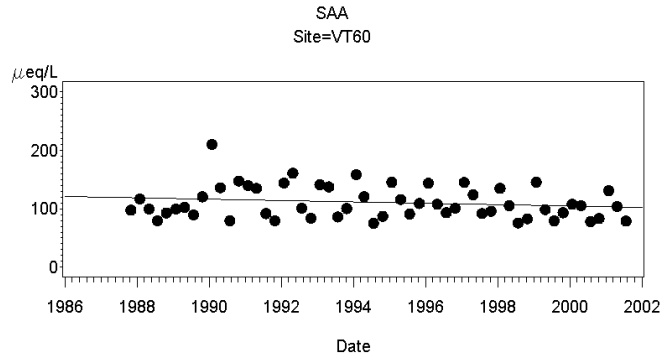

Regression Equation:
saa = 1368.182 - 0.624574*Date



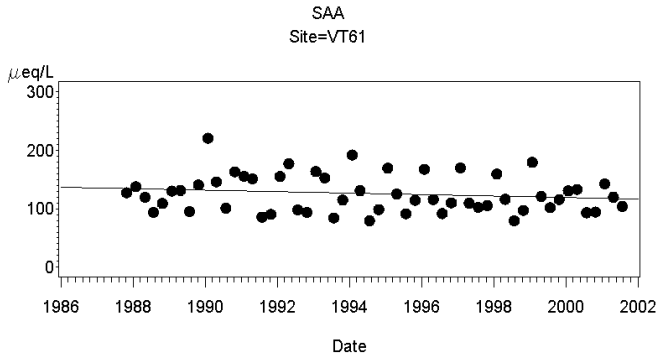

Regression Equation:
saa = 931.3231 - 0.432369*Date



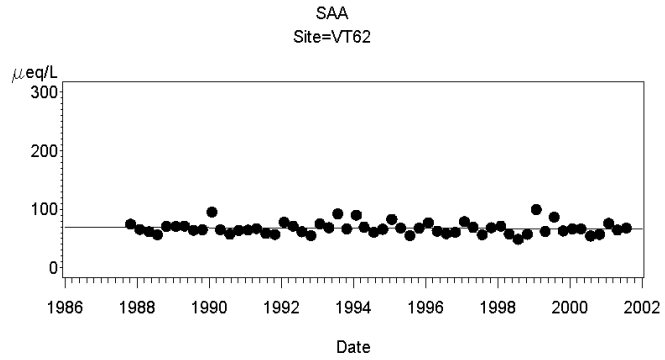

Regression Equation:
saa = 412.1573 - 0.172398*Date



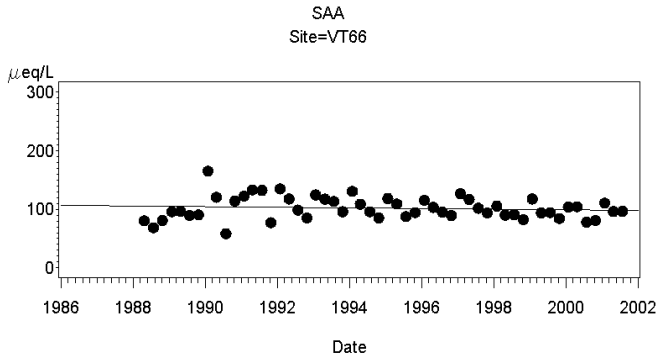

Regression Equation:
saa = 2561.052 - 1.228497*Date



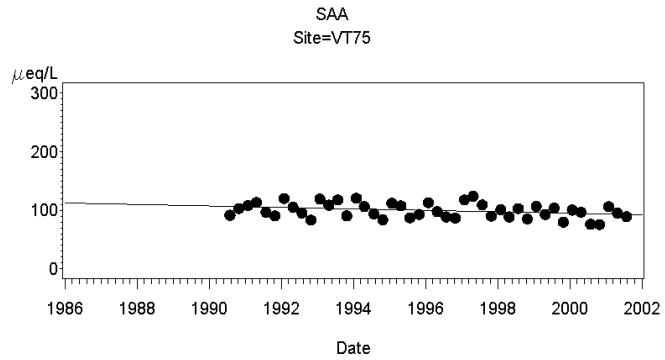

Regression Equation:
saa = 2634.723 - 1.258068*Date



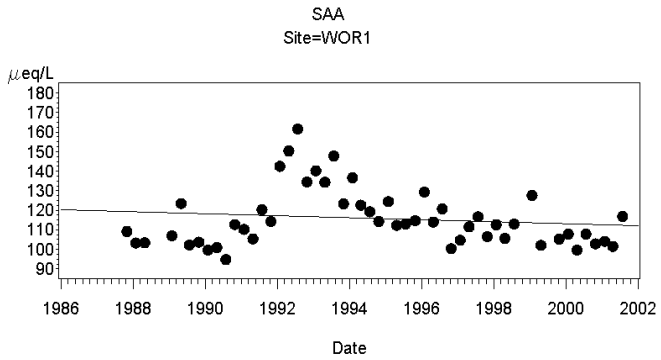

Regression Equation:
saa = 294.7419 - 0.113692*Date



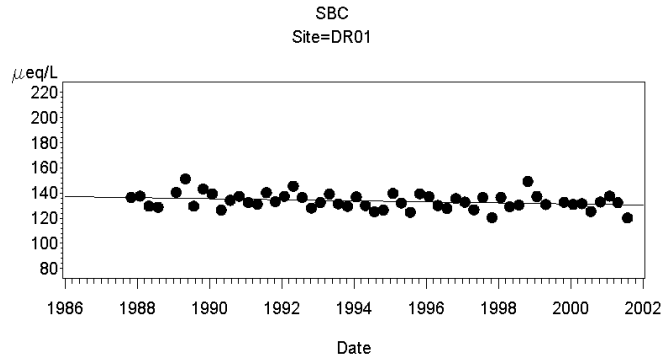

Regression Equation:
saa = 1185.596 - 0.542991*Date



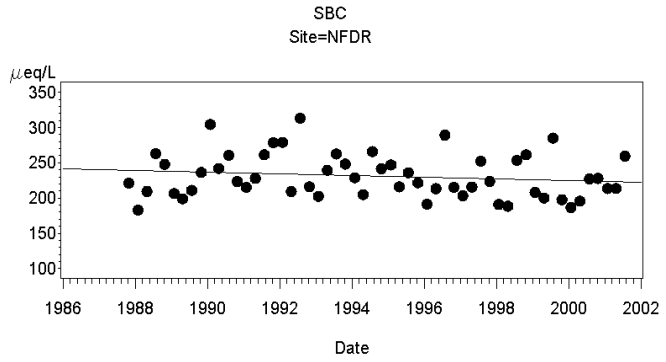

Regression Equation:
saa = 2475.23 - 1.190102*Date



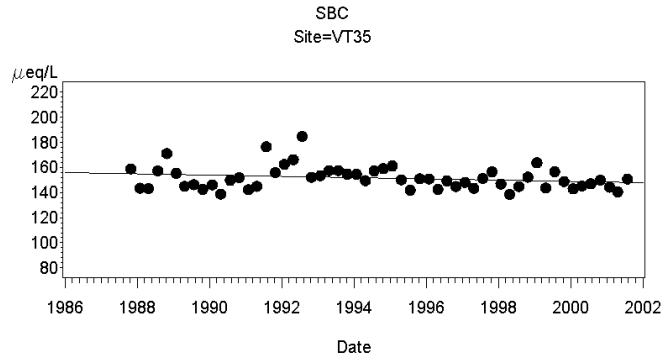

Regression Equation:
saa = 1110.296 - 0.4986*Date



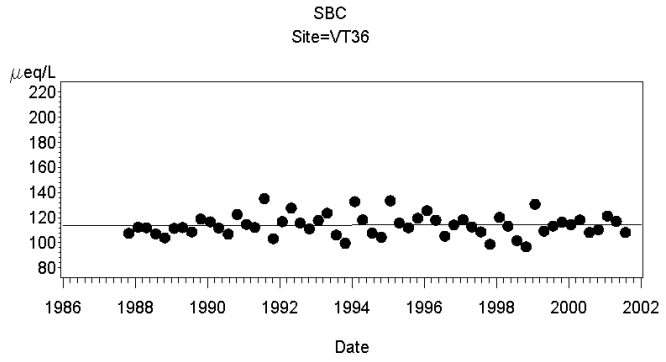

Regression Equation:
sbc = 1003.202 - 0.435942*Date



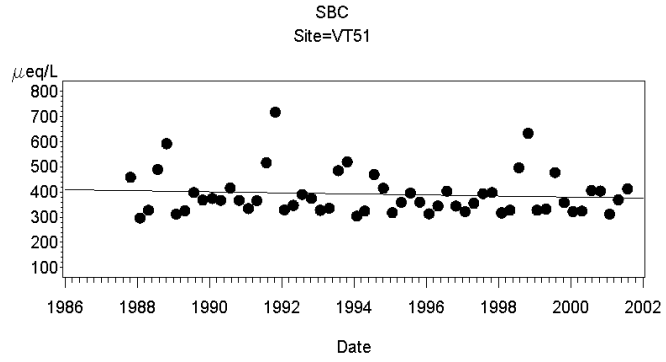

Regression Equation:
sbc = 2597.179 - 1.186139*Date



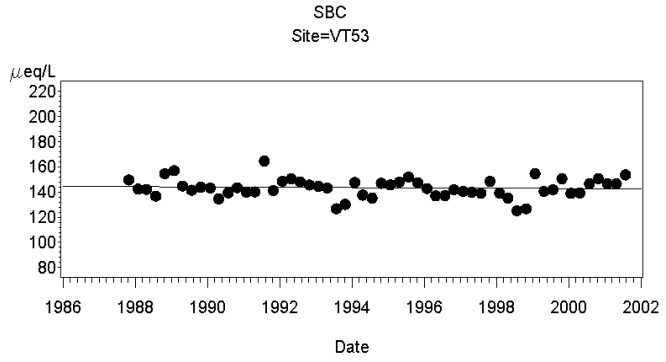

Regression Equation:
sbc = 1179.182 - 0.515152*Date



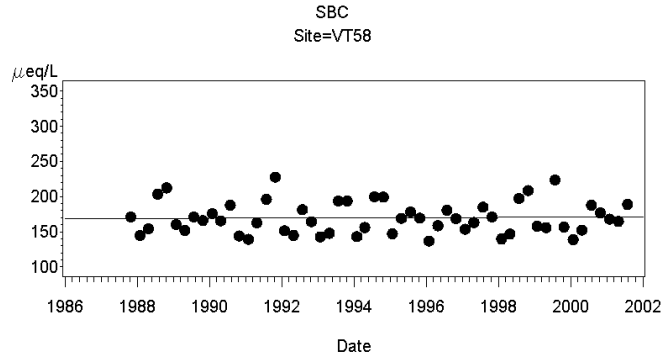

Regression Equation:
sbc = 42.98058 + 0.035626*Date



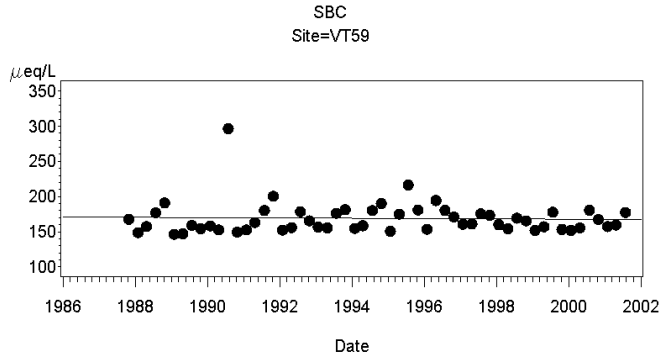

Regression Equation:
sbc = 4535.251 - 2.078446*Date



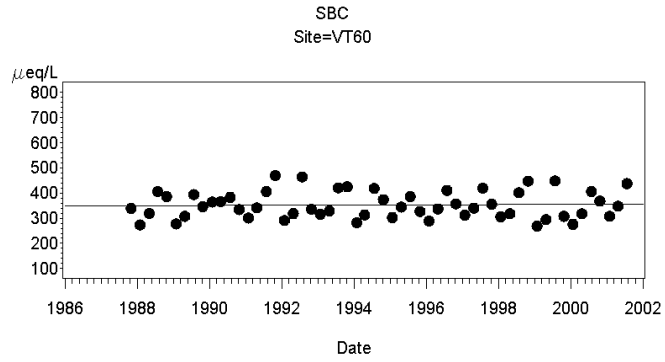

Regression Equation:
sbc = 446.7112 - 0.152108*Date



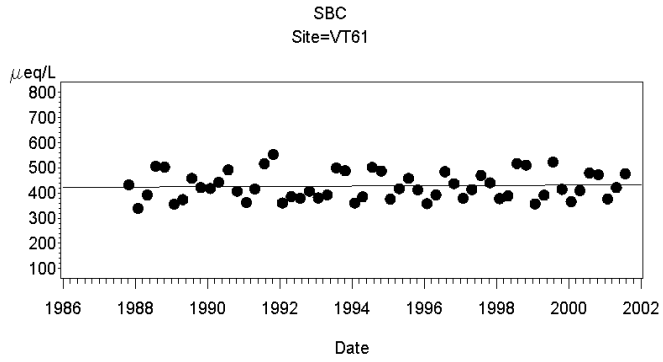

Regression Equation:
sbc = 13.12284 + 0.078531*Date



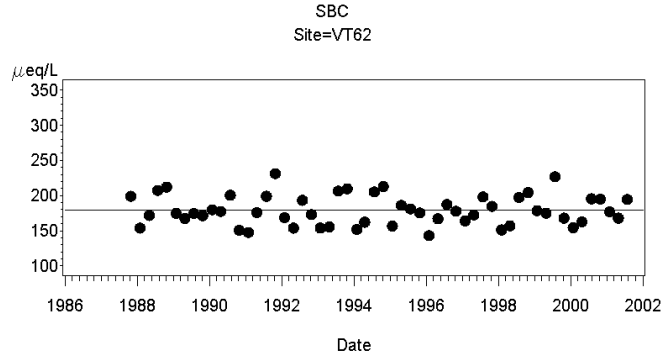

Regression Equation:
sbc = 691.9972 - 0.262306*Date



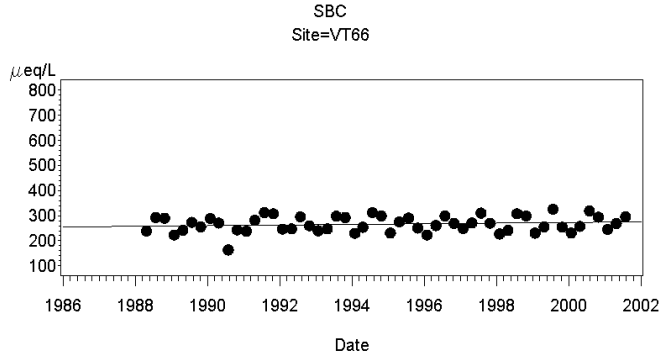

Regression Equation:
sbc = -591.4077 + 0.473409*Date



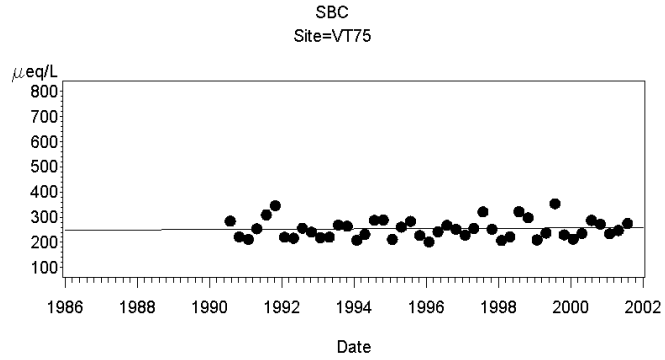

Regression Equation:
sbc = -1097.824 + 0.764971*Date



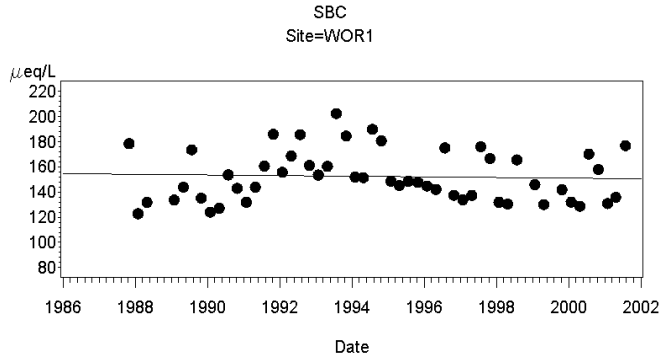

Regression Equation:
sbc = 165.2742 + 0.0071*Date



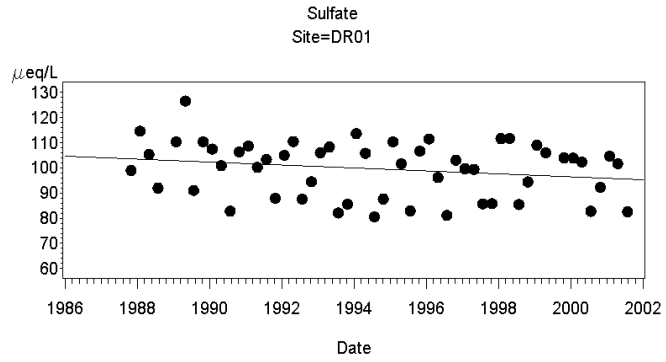

Regression Equation:
sbc = -2250.47 + 1.261961*Date



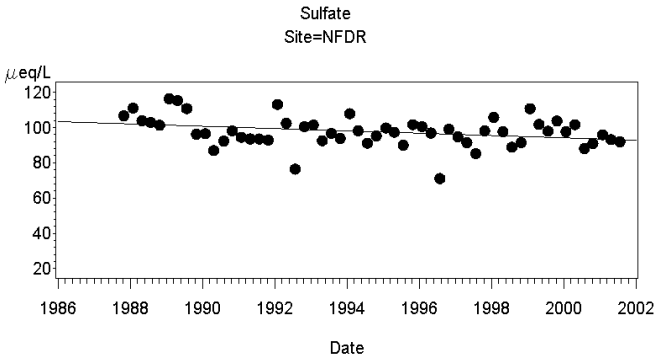

Regression Equation:
sbc = -1092.751 + 0.674612*Date



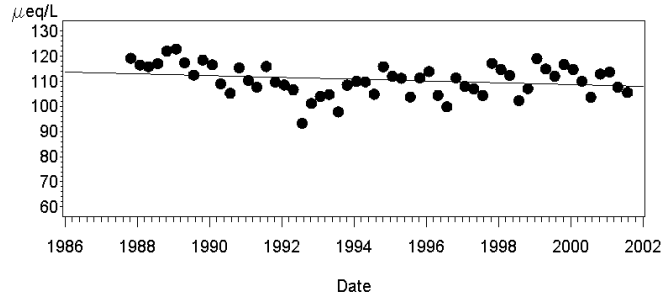

Regression Equation:
sbc = 574.9436 - 0.211857*Date



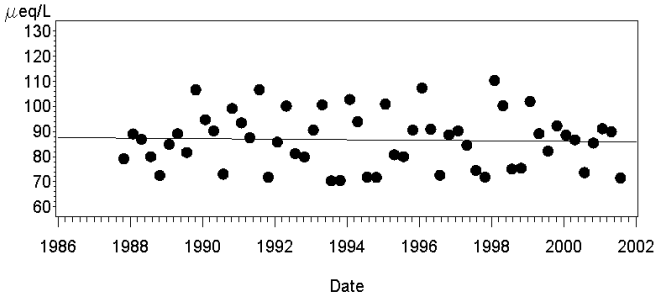

Regression Equation:
SO4 = 1244.275 - 0.573908*Date



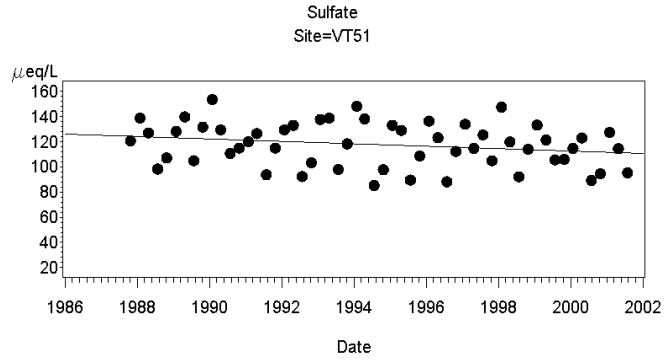

Regression Equation:
SO4 = 1358.48 - 0.632081*Date



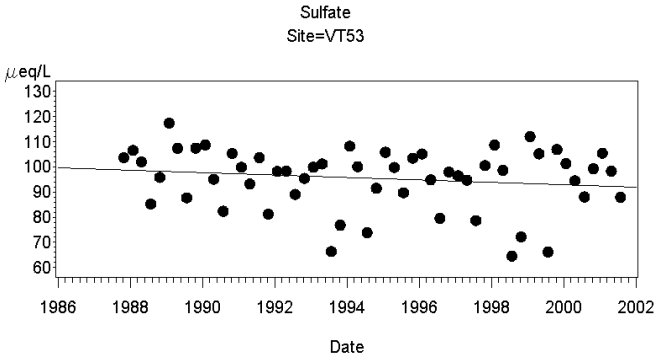

Regression Equation:
SO4 = 806.08 - 0.34869*Date



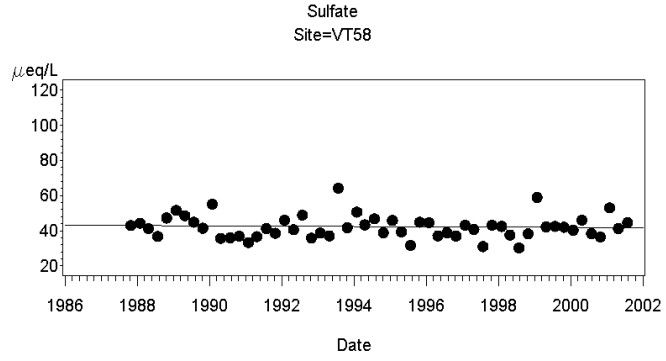

Regression Equation:
SO4 = 281.5882 - 0.097693*Date



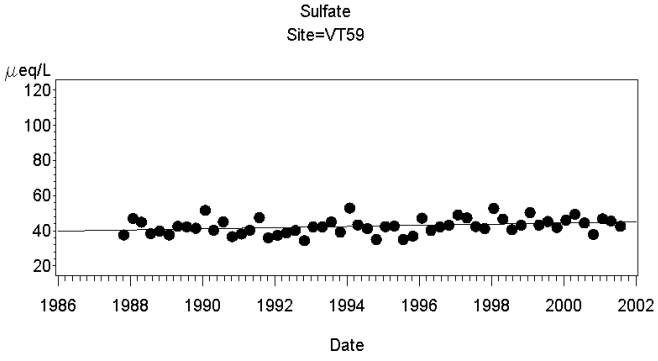

Regression Equation:
SO4 = 2055.77 - 0.971697*Date



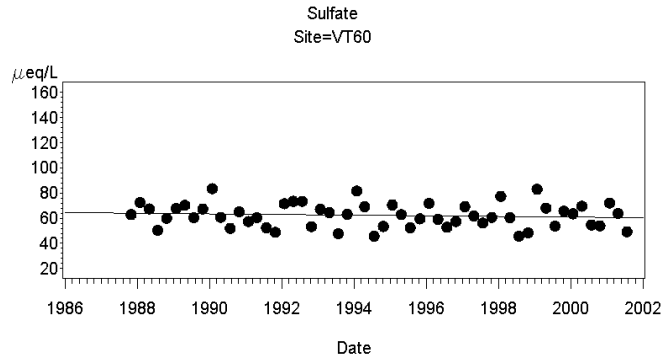

Regression Equation:
SO4 = 1075.546 - 0.491399*Date



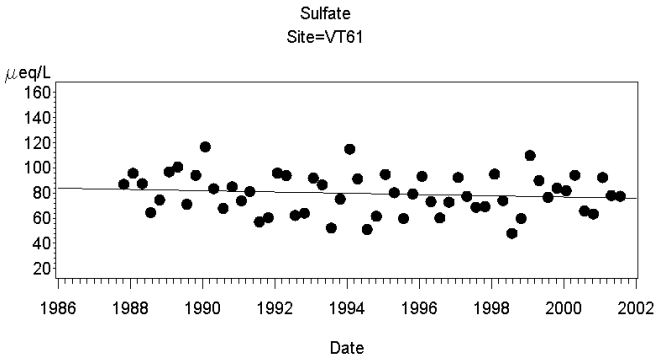

Regression Equation:
SO4 = 229.2576 - 0.093803*Date



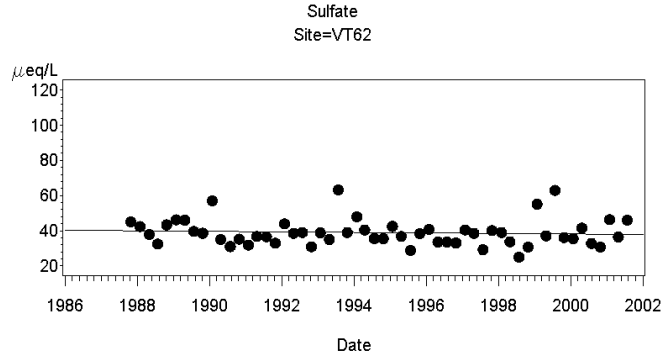

Regression Equation:
SO4 = -614.4821 + 0.329446*Date



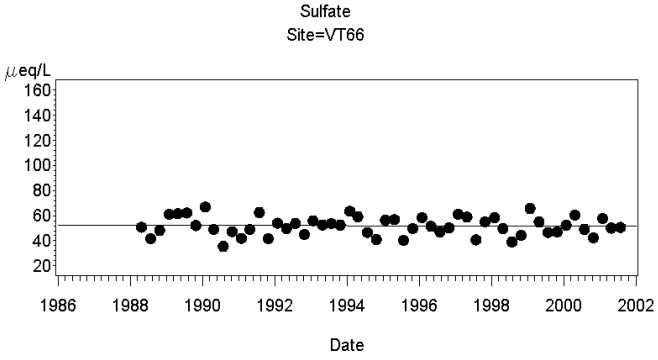

Regression Equation:
SO4 = 553.6827 - 0.246309*Date



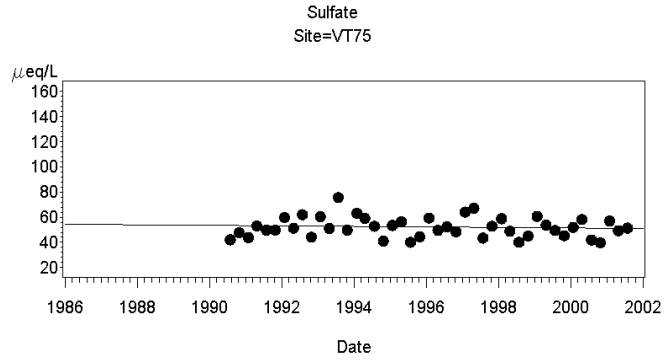

Regression Equation:
SO4 = 1126.814 - 0.525022*Date



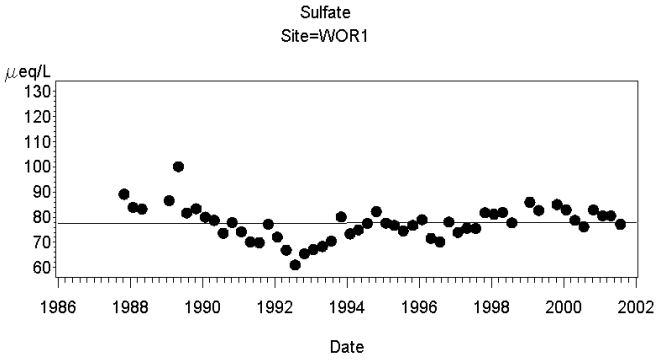

Regression Equation:
SO4 = 309.4081 - 0.135551*Date




Regression Equation:
SO4 = 171.9832 - 0.060212*Date




Regression Equation:
SO4 = 473.8638 - 0.211298*Date




Regression Equation:
SO4 = 52.37576 + 0.012667*Date